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Proceedings Series 2007/015 | Série des comptes rendus 2007/015

Proceedings of a Workshop on the Inner Bay of Fundy Salmon Presence Assessment Tool (SPAT)

26 June 2006
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Dartmouth, Nova Scotia

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June 2007

Compte rendu d'un atelier sur l'outil d'évaluation de la présence de saumons de l'arrière-baie de Fundy

Le 26 juin 2006
Institut océanographique de Bedford
Dartmouth (Nouvelle-Écosse)

Tana Worcester (président)

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Juin 2007

Canada

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made by the meeting. Proceedings also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenus dans le présent rapport puissent être inexacts ou propres à induire en erreur, ils sont quand même reproduits aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considéré en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

2008-04793/

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ISSN 1701-1272 (Printed / Imprimé)

Published and available free from:
Une publication gratuite de:

Fisheries and Oceans Canada / Pêches et Océans Canada
Canadian Science Advisory Secretariat / Secrétariat canadien de consultation scientifique
200, rue Kent Street
Ottawa, Ontario
K1A 0E6

http://www.dfo-mpo.gc.ca/csas/

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Printed on recycled paper.
Imprimé sur papier recyclé.

Correct citation for this publication:
On doit citer cette publication comme suit:

DFO, 2007. Proceedings of a Workshop on the Inner Bay of Fundy Salmon Presence Assessment Tool (SPAT); 26 June 2006. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2007/015.

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SUMMARY

Department of Fisheries and Oceans (DFO) Maritimes staff from the Science Branch and Oceans and Habitat Branch met on 26 June 2006, to review and discuss the next steps for the Salmon Presence Assessment Tool (SPAT) that was being developed by the Habitat Management Division (HMD). A presentation on the design of this Microsoft Access and GIS-based tool was followed with a chapter-by-chapter review of the associated working paper. Suggestions were made on possible improvements to the tool, including development of a more quantitative and statistically meaningful approach, for the determination of potential presence of salmon in the freshwater environment defined by the geographic scope of the tool. Discussion also ensued on the potential role of this tool in decision-making. It was agreed that further modification and input was required prior to use of this database as a potential decision-support tool. Other formats for presentation of the information contained in the database, such as a static map, were also suggested.

SOMMAIRE

Des membres du personnel de la Direction des sciences et de la Direction des océans et de l'habitat de la Région des Maritimes du MPO se sont réunis le 26 juin 2006 pour discuter des prochaines étapes dans l'élaboration de l'outil d'évaluation de la présence de saumons qu'est en train de produire la Division de la gestion de l'habitat. Un exposé sur la conception de l'outil fondé sur Microsoft Access et le SIG a été suivi d'un examen, chapitre par chapitre, du document de travail connexe. Des suggestions d'améliorations possibles à l'outil ont été présentées, nomment concernant l'établissement d'une approche plus quantitative et plus significative sur le plan statistique pour déterminer la présence éventuelle de saumons dans le milieu d'eau douce défini par le champ géographique de l'outil. Certaines des discussions ont aussi porté sur le rôle que jouerait cet outil dans le processus décisionnel. Il a été convenu que d'autres modifications et avis étaient nécessaires avant que cette base de données puisse servir d'outil d'appui décisionnel. D'autres formes de présentation de l'information contenue dans la base de données, p.ex. une carte statique, ont aussi été suggérées.

INTRODUCTION

Meeting Chair, Tana Worcester, welcomed participants and reviewed the Terms of Reference for the meeting (Appendix 1). Meeting objectives were to answer the following questions:

1) Is the data used in the Salmon Presence Assessment Tool (SPAT) to assess the likelihood of salmon presence appropriate within the context of SPAT?
2) Are there any missing data sources that should be included in SPAT?
3) Are the different types of data used weighted appropriately when used to establish the likelihood of salmon presence (i.e., should Live Gene Bank (LGB) activity be the primary indicator of salmon presence)?

The Agenda for this meeting is provided in Appendix 2.

Discussion

The primary science question to be addressed at this meeting is; "Does the proposed Salmon Presence Assessment Tool (SPAT) provide a valid indication of the likelihood of finding inner Bay of Fundy (iBoF) salmon at any location in the freshwater environment within the geographic scope of the tool?". However, some concern was expressed by DFO Science that 'likelihood of presence' may not be the best measure of productive capacity; which is also of interest to Habitat Management. Likelihood of finding salmon habitat may be a better measure. There may be times when Habitat Management is not only interested in fish habitat, but also in the likely presence of individual fish (e.g., mitigation of short-term impacts, such as noise, that may harm fish but not necessarily fish habitat). There was also some desire by Habitat Management to use this tool in a triage approach to determining the relative level of risk to salmon given a large range of possible habitats.

Another objective of this meeting was to establish the next steps for revision and review of the Salmon Presence Assessment Tool. Science suggested that if a tool based on science information was expected to contribute to Habitat Management's decision-making process and, therefore, may have an impact on external stakeholders, then peer review of the tool may help to address the Government of Canada's principles for effective use of science and technology advice in government decision-making (Council of Science and Technology Advisors 1999). If open peer review is not conducted, external feedback may still be useful.

PRESENTATION

Salmon Presence Assessment Tool Peer Review
A. Newbould (SPAT lead author)

This presentation was intended to provide an introduction to inner Bay of Fundy (iBoF) Atlantic Salmon, the Habitat Management Division's (HMD) role in the management of impacts to iBoF salmon and salmon habitat, the Salmon Presence Assessment Tool (SPAT); including data and databases used, the GIS and Microsoft Access interface, and an example of the potential use of SPAT for an assessment of a theoretical causeway on the Irish River.

Inner Bay of Fundy (IBoF) Salmon

Inner Bay of Fundy salmon were designated as 'endangered' by COSEWIC in 2001, and the remaining adult population is estimated to be 250 individuals or less. These salmon reside in a 'collection' of rivers that enter the iBoF (Figure 1). An allowable harm assessment conducted by DFO Science concluded that no harm was tolerable.

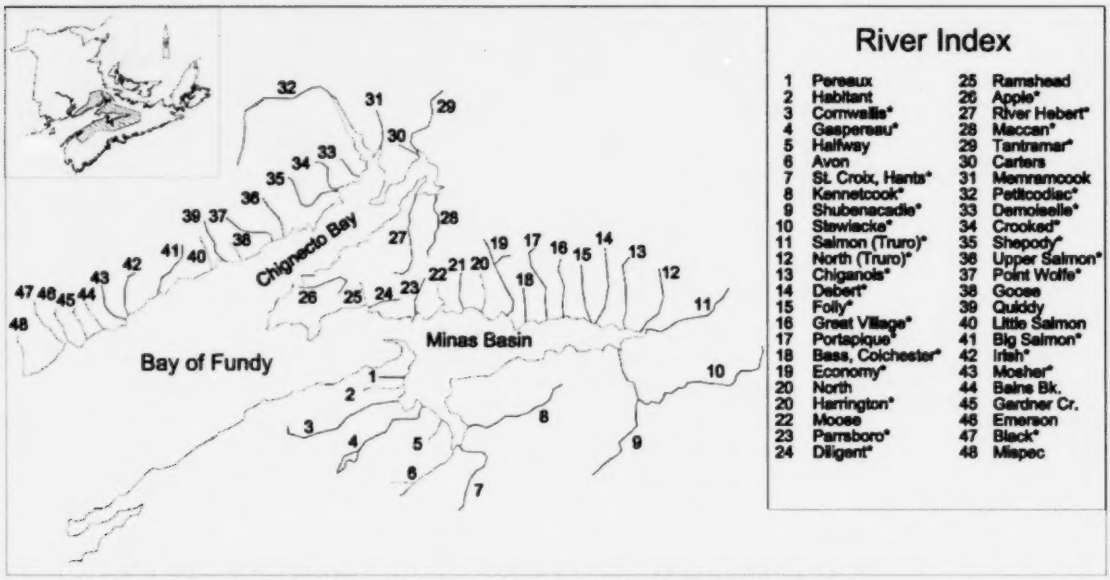

Figure 1. Inner Bay of Fundy salmon rivers as identified in Trzcinski et al. (2004).

Habitat Management Division (HMD) Involvement

In HMD's referral review process, they must ensure that decisions are compliant with the *Fisheries Act* and the *Species At Risk Act* (SARA). For iBoF Atlantic salmon, the conditions of SARA permitting are more strict because any human-induced harm could jeopardize its survival and recovery.

The Problem

The iBoF region is very large, very few iBoF salmon remain, and the likelihood of iBoF salmon presence can vary within a watershed. HMD assessors need to know where SARA applies (i.e., where iBoF salmon are) in the iBoF region. This situation lends itself well to the design and implementation of a decision-support tool.

SPAT

SPAT, in its current form, is a decision-support tool (DST) that provides information on the main 48 iBoF watersheds, and that tries to indicate the likelihood of iBoF Atlantic salmon presence at any site on the main stem, primary tributaries, and secondary tributaries of those watersheds. Data used in SPAT include:

- Live Gene Bank fish distribution data.
- Fish Passage Barrier location data.
- Electrofishing data.

- Theoretical Parr Production.
- Historic Catch data.

Live Gene Bank Data

The LGB program is a breeding and stocking initiative with the aim of preventing extirpation of iBoF salmon. The existence of stocking from the LGB in a watershed is considered the primary indicator of presence in SPAT. Data used includes location of release site, number released, and date released. This data was obtained from the Population Ecology Division (PED) of DFO Maritimes Science. SPAT currently contains only 2001-2002 data.

Fish Passage Barrier Data

Fish Passage Barrier data includes natural and man made barriers, such as waterfalls, dams, culverts, and aboiteaux. It is used to indicate the likely access of fish to the ocean, as well as access to LGB release sites and electrofishing sites. Access to the ocean is considered to be the second most important indicator of presence. Data used includes location and whether the barrier is a partial or complete barrier to fish passage. This data was obtained from the Tidal Barrier Database Project, federal GIS layers, and from PED. However, the current collection of barriers entered is not comprehensive, and it is hard to include less predictable barriers such as habitat degradation or water quality issues

Electrofishing Data

Electrofishing is a technique used to assess fish species composition and population density. This is the third most important indicator of salmon presence in SPAT. Data used includes location of electrofishing site and whether iBoF salmon were caught. This data was obtained from PED. At present, electrofishing data in SPAT is not comprehensive. Because of accessibility requirements, survey sites are typically located near bridges or trail crossings, which could lead to the collection of unrepresentative data.

Parr Production

Parr production was derived from streambed gradient and area; higher parr production rank equals more habitat. This is the fourth most important indicator of salmon presence. Estimates of parr production were obtained from Figure 4 in Amiro et al. (2003). These estimates used in SPAT were at a course scale with limited precision.

Historic Catch Data

Historic catch data includes recreational salmon angling and electrofishing records from 1954–1998. This is the fifth most important indicator of salmon presence in SPAT. Historic catch was taken from Gibson et al. (2003). Historic catch was used under the premise that the rivers that once held the largest populations of iBoF salmon would be the most resistant to extirpation.

Components of SPAT

SPAT currently includes a database component, an ArcGIS component, and an assessment tool. The database (Figure 2) provides search capabilities, stores and displays data, and houses the assessment tool. ArcGIS (Figure 3) is used as essential spatial information could not be conveyed exclusively through a database. The assessment tool (Figure 4) utilizes information from the main watershed information form and the maps provided, to indicate the

likelihood of iBoF Atlantic salmon presence. Using the information provided, SPAT will suggest the likelihood of iBoF Atlantic salmon presence at the selected site as either very high (red), high (orange), moderate (yellow), or low (green).

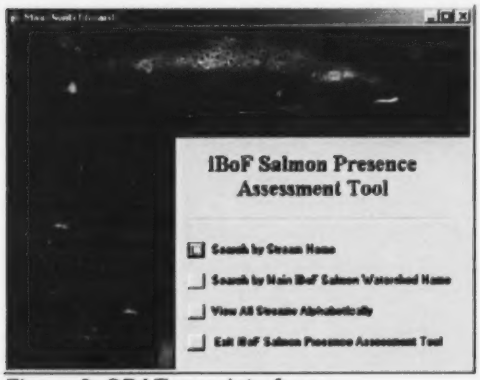
iBoF Salmon Presence
Assessment Tool
Search by Stream Name
Search by Main iBoF Salmon Watershed Name
View All Streams Alphabetically
Exit iBoF Salmon Presence Assessment Tool

Figure 2. SPAT user interface.

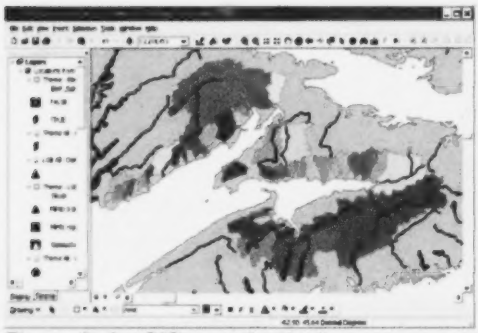

Figure 3. ArcGIS mapping tool.

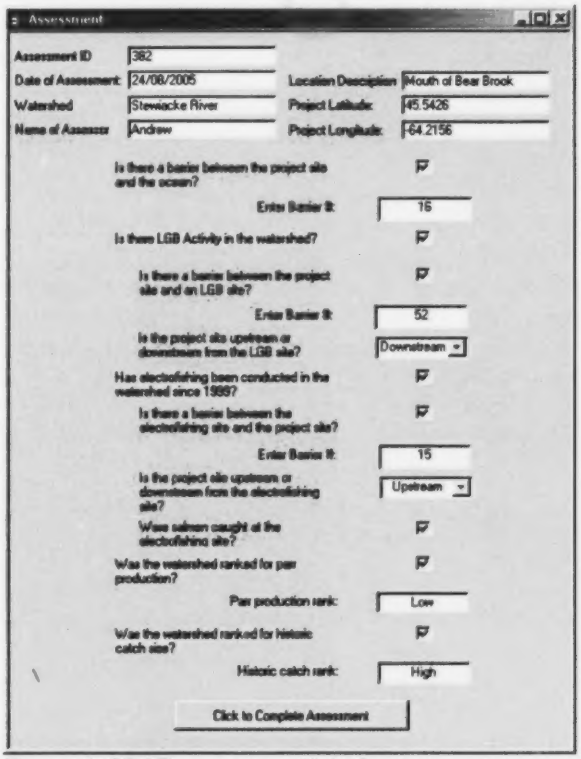

Figure 4. SPAT assessment interface.

Irish River Example

It was then demonstrated how SPAT could be used to assess whether the construction of a causeway on the Irish River, N.B., would require SARA consideration.

DISCUSSION

General Discussion

Following the presentation, participants asked a number of questions of clarification. For example, how catch data is used in SPAT was clarified. It is not used to determine presence or absence of catch, rather it is used to establish whether there is a high, medium, or low level of catch. Also, the scale of parr production determination was at the watershed scale; the base maps used were standard 1:50,000 maps, and there is no dynamic formula or quantitative model used to calculate the final likelihood of salmon presence at any particular location. Rather, the likelihood of salmon presence for each section of river is determined through a standard set of predefined criteria, such as whether or not there is a barrier to movement between the location of interest and a location at which salmon had previously been observed. At present, all locations are considered to have at least a low likelihood of salmon presence.

The relationship between the Access database and the GIS mapping tool was also clarified. At present, there is no automated connection between these systems. The user must enter information obtained from the GIS map into the Access database at a predefined point in each query.

The scope and limitations of this Salmon Presence Assessment Tool (spatial, temporal, and conceptual) should be clarified.

Discussion of each Section in Working Paper (Newbould et al. 2006)

Inner Bay of Fundy Salmon

While the working paper references Trzcinski et al. (2004), it does not reference a related document, Gibson et al. (2003) that identifies the presence of electrofishing data for other rivers connected to the inner Bay of Fundy (i.e., rivers that were not identified as inner Bay of Fundy salmon rivers in Figure 1). It is possible that there are other rivers connected to the inner Bay of Fundy in which there may be a greater likelihood of finding salmon than in the rivers identified in Figure 1. It was noted that COSEWIC recognizes all rivers in this area as potentially inner Bay of Fundy salmon rivers.

The need for full GIS dynamic mapping capability was identified, as static maps were found to be cumbersome and not very useful.

It was noted that Verspoor et al. (2006) has now been published. 'Gibson (2004)' should read Gibson et al. (2004), which is not currently in the reference list. 'Doucette et al. (2002)' is also not in the reference list, and it probably refers to Doucette and Hargrave (2002).

Figure numbers need to be fixed. The number of returning adult salmon to the iBoF region should be verified; and make sure that this value is used consistently throughout the report. Mortality at sea is not considered to be an inference. Analysis has been provided in Trzcinski et al. (2004) and COSEWIC (2006).

When discussing the numbers of adult salmon, there is a need to differentiate wild from Live Gene Bank production contributions, so that it doesn't sounds as though there are only 200 individuals left. Be sure to mention both juveniles in rivers and adults in facilities.

For the purposes of this tool, is it important to distinguish between aquaculture escapees and iBoF salmon? As of yet, there is no good way to distinguish aquaculture fish from wild fish. Samples have been collected but not everything has been processed. SPAT could include information on whether fish samples were processed or not. The workload that would be required to process every sample would be huge. Therefore, for the purposes of this tool it would be useful to clarify that salmon presence does not necessarily indicate presence of iBoF salmon. For example, in a sample of 23 adult salmon, 5 were determined of LGB origin and 5 had alleles indicative of aquacultured fish.

Habitat Management Decision Making and iBoF Salmon

Is habitat compensation always required upon authorization of a harmful alteration, disruption or destruction (HADD) of fish habitat? Compensation is recommended under DFO's Policy for the Management of Fish Habitat as a way to achieve the no net loss principle, but it is not specifically required in the *Fisheries Act*. The habitat provisions of the *Fisheries Act* may not be

relevant for this tool, since the tool deals only with the presence of fish and not the presence of fish habitat.

While it is useful to differentiate requirements of the *Fisheries Act* versus requirements of the *Species at Risk Act* (e.g., fines), it may not be useful to state whether these requirements are more or less difficult to achieve.

What is SPAT?

This section should clarify the purpose of the tool. If the tool is meant to address a specific section of the *Fisheries Act* (e.g., section 32: No person shall destroy fish by any means other than fishing except as authorized by the Minister or under regulations made by the Governor in Council under this *Act*), this should be clearly stated.

Definition of likelihood is required as it is not clear how it is being used. It is not being used in a statistical or probabilistic sense, rather it is being used to refer to a qualitative assessment. Improvements to this tool may require a move towards a more statistically valid determination of likelihood. This might be possible to produce, but it would require some work. It may be possible to build a better GIS integration tool. Testing of the tool was also recommended. At the very least, the decision structure that was used to establish possible outcomes should be presented for review.

It was unclear from the working paper what level of likelihood was considered to be high, i.e., is a high likelihood of finding salmon according to this tool equivalent to a 50 or 90% probability of detecting salmon, if you were to go and electrofish at that location. Even electrofishing may not be sufficient to detect salmon presence with a very high (99%) level of certainty. A table defining what is meant by high, medium, and low likelihood may help.

Sources of error and uncertainty are not clearly identified within the tool itself, which may lead to potential misunderstanding of the results. There is no temporal component to this tool, i.e., the tool does not identify what times of the year salmon may be present at a particular location.

Is it possible to establish functionality of habitat? Two other countries have done this, so it should be possible.

Live Gene Bank Data

The statement that "progeny can then be released to bolster remaining wild populations" is not entirely accurate. In fact, they are released to maximize exposure. Alternative wording should be found.

How should stocking above impoundments be addressed? Is there a timeframe during which smolts might be expected to remain? Some 4-year old smolts have been observed, so the timeframe for inclusion should be at least five years.

Big Salmon and Stewiake rivers are not the only LGB rivers.

More information should be provided on the origin of the stock, numbers of fish, origin of river, etc.

It was unclear how numbers of LGB fish released were incorporated into the tool. At present, the database includes information on the numbers that were released; however, the

determination of whether or not salmon are likely to be present only depends or whether or not there was stocking.

Discussion on whether or not barriers could be considered impassible was inconclusive. Some felt that barriers were always passable in the downstream direction.

SPAT assumes that salmon may be present at any location in a watershed with LGB activity; however, this may not be the case. It would likely depend on the numbers released and at what life history stage. It would be useful to have a distribution model that could be verified through sampling.

SPAT may be helpful in determining whether there is either some probability of finding an inner Bay of Fundy salmon at a particular location, or no probability of finding an inner Bay of Fundy salmon at that location. As of yet, it is not useful at determining what the probability may be.

SPAT should notify users when the LGB activity data is out of date.

It was recommended that SPAT be linked directly to the salmon distribution database. It was recognized that this may not be a straightforward Informatics exercise, but there was some desire to attempt it in the future.

It was unclear to some how stream/river names related to other databases. For example, 'Debert and Foley River' are two rivers, but some classifications list it as one. It may be worthwhile to establish some standardization for stream/river names.

Fish Passage Barrier Data

It was recognized that barrier data contained within the SPAT database is incomplete; however, it was not clear how new data would be entered. The alternatives are to allow individual Habitat managers to input new data or to have one person responsible for entering new data. Ongoing maintenance requirements of the system will need to be considered if it is going to continue as a dynamic system. It was suggested that links with existing databases be automated to the extent possible.

At present, SPAT does not identify age specific barriers; however, it was recognized that age class can effect the likelihood that a salmon is able to navigate a barrier. A large proportion of the 542 barriers currently included in SPAT are recognized as partial barriers.

Could historic electrofishing data be used to determine the status of a barrier? For example, if salmon are found above an old barrier, then this may be an indication of a partial barrier.

At present, determination of the likelihood of salmon presence at a particular location does not vary greatly whether there is a partial barriers or no barrier at all; however, it may make a difference if there are two partial barriers. The treatment of partial barriers needs to be resolved. For now, it was recommended that information about the type of barrier should be retained within the database even if it is not used in the determination of salmon presence. The general consensus was that barriers either exist or they don't – with the current level of understanding, the categorization of 'partial barriers' is not expected to be useful.

At present, the velocity gradient of a stretch of river is not taken into account in the determination of likely salmon presence using SPAT. However, this may be a valid reason that salmon are not likely to be present. It would be possible to conduct a literature review to

determine what velocity gradient are for many rivers and streams. However, it was agreed that this may add unnecessary complexity to the model. Rather, it may be useful to consider falls greater than 3.4 m as a barrier to salmon (smolts and adults).

If the current SPAT decision rules are to be used, it should be made clear to Habitat managers that partial barriers may allow fish passage, i.e., the risk is higher than if there is a complete barrier, and lower than if there is no barrier.

Electrofishing Data

Electrofishing data from 2000-2002 is considered to be a good snapshot of residual populations, where they are detected. However, lack of salmon capture during electrofishing is *not* considered to be a good indication that salmon are not present. In addition, absence of salmon at an electrofishing site should definitely *not* be considered to indicate that salmon are absent from any other area of the same watershed even if there is unimpeded fish passage. It is not currently possible to differentiate iBoF salmon from other salmon in the field.

Should electrofishing data be re-evaluated in five years? Only now is electrofishing data being used as evidence for wild populations. In five years, there may be a better way to identify whether iBoF populations exists in an area or not. The usefulness of reviewing these data in five years may also depend upon the recovery iBoF salmon.

What conclusions can be drawn if electrofishing was conducted and there were still no records of juveniles and no adult salmon for over five years? Would you allow potentially harmful activities or would you require collection of additional data? It was felt by some that the precautionary approach suggests that one should act as if there might be salmon present.

The 'data limitations' section of this part of the working paper needs to be revised. In particular, the last two sentences should be removed.

Parr Production

Parr production is an estimate of the number of salmon required to optimize smolt production, i.e., carrying capacity. It is not the number of juvenile salmon present per unit area.

SPAT uses the parr production summary by watershed. However, some rivers have larger population but overall lower carrying capacity. Information on the rate of decline in parr production may also be useful for prioritization.

It was felt that an estimate of parr production at the watershed scale may not be useful for site specific evaluation, particularly since it is not scaled to population size.

Where parr production estimates exist on a reach or river scale, it should be utilized. Information can be provided for the 22 rivers where estimates have been calculated.

Parr production could potentially be used as a habitat descriptor, but it should not be used as an indication of the likelihood of salmon presence. Use of parr production merely contributes evidence for recruitment in a 'weight of evidence' approach. Using this approach, electrofishing evidence of presence is stronger than habitat suitability, which is stronger than historic evidence.

Historic Catch Data

Information on historic catch may be useful in a descriptive sense, but it may not be required for decision-making. Historic catch merely indicates that there were fish once and may be fish now.

Scaling of values into high, medium, and low may be problematic, since relative ranking should may be correlated with river size. Providing an indication of whether or not there is a record of historic catch may be more appropriate.

Historic catch may be a better predictor of habitat suitability than of potential fish presence.

ACCESS Database

Habitat Management should determine river hierarchy through the use of algorithm to determine relationships. This should be investigated further. ArcInfo may have tools to do this. It may be possible to build a topology and a numbering system (e.g., work by the Nature Conservancy).

Habitat Management's data management initiatives should be connected with DFO Science data management initiatives.

Ocean distribution of salmon is not addressed within SPAT.

Weighting

Numerous questions related to the weighting of various factors, such as parr production, to reach a particular conclusion were asked. It became clear to reviewers that an alternative, more quantitative, method was required. Simplification was recommended. For example, if there was no difference between historic catch and parr production, then catch should be removed from the decision tree.

New Decision-Tree

Recommendations for a new decision-tree were provided.

Question 1: Is there recruitment, i.e., is there a wild population?
Answer: Yes or no.

Evidence of a wild population would include:
- Electrofishing
- Historic catch
- Unknown (data deficient)

Question 2: Is there LGB activity?
Answer: Yes or no.

Top priority rivers would have recruitment and LGB activity. Second priority rivers would have recruitment but no LGB, and third priority rivers would have no recruitment but LGB activity.
Question 3: Is there a barrier to migration?
Answer: Yes or no.

It may be useful to pre-categorize rivers rather than using an automated decision-tree. Rather than providing Habitat managers with a decision-tool, it may be more useful to provide them

with the list or map of rivers by category. A map showing color-coding of rivers may be useful. However, this would have to be updated as new information arose. For example, Fisheries and Aquaculture Management Branch has received money to expand our knowledge of barriers.

NEXT STEPS

A Science priority would be to spend $15-20,000 to determine if there is recruitment of wild populations.

Fisheries and Aquaculture Management Branch might be interested in SPAT for evaluation of requests for licenses to conduct scientific research in iBoF salmon rivers.

Oceans and Habitat Management Branch has requested money to 1) improve the data in SPAT, 2) add new data, such as information on electrofishing and barriers, and 3) develop the mapping component of this project.

The electrofishing data that is currently in SPAT is what is needed to establish historic recruitment. New data is only useful to determine the success of LGB activity. The ecosystem can handle some loss of fish because of the addition of LGB fish. We still haven't shown that adult LBG salmon are spawning. Population persistence will be the true measure of success.

It is not yet clear what role habitat impact will play in iBoF salmon survival and recovery. It may be useful to test the assumption of a 3 to 1 ratio for salmon habitat compensation. Due to the status of iBoF salmon, one scientist felt that it might be more appropriate to require a ratio of 100 to 1 (or something else) for compensation of salmon habitat. Habitat Management did not consider this to be a feasible option.

The iBoF salmon recovery plan is due June 6, 2006. Next steps for SPAT should wait until the recovery plan is produced, or should be conducted in cooperation with the recovery team.

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Appendix 1: Terms of Reference

Workshop on Inner Bay of Fundy (iBoF)
Salmon Presence Assessment Tool (SPAT)

June 26, 2006
Hayes Boardroom, B.I.O.
Dartmouth, N.S.

Terms of Reference

Context

Habitat Management Division (HMD) makes regulatory decisions on proposed projects that may affect fish and fish habitat in the Maritimes Region. This region includes areas where the endangered inner Bay of Fundy (iBoF) Atlantic salmon, a species protected under the *Species at Risk Act* (SARA), are found. An Allowable Harm Assessment (AHA) for iBoF salmon was conducted in 2004 to provide Science advice on what, if any, harm can be permitted to this species through the SARA permitting processes. Certain conditions and criteria must be met before a SARA Section 73 (allowable harm) permit can be issued, namely, the harm permitted must not jeopardise the survival and recovery of the species. The AHA for IBoF salmon concluded that:

> *The severely depressed state and productivity of Inner Bay of Fundy salmon implies that any level of human-induced harm could jeopardize its survival or recovery. Recovery activities, including understanding the processes acting on the population are essential to the survival and recovery of the population. All efforts are encouraged to minimize the impact of human activities on this population.*

Given this advice, there are limited SARA permitting options for proposed projects in the Inner Bay of Fundy region.

In attempt to ensure compliance with SARA, and to minimize the impacts of human activities on iBoF salmon, HMD has developed a Salmon Presence Assessment Tool (SPAT). SPAT is a decision-support tool (DST) which pools together information on salmon and salmon habitat to provide an indication of the likelihood of salmon presence at any site on the main stem, primary tributaries and secondary tributaries of the 48 main watersheds in the iBoF region.

Over the course of developing SPAT, HMD has consulted informally with DFO Science to acquire data, as well as to gain some feedback on various aspects of the project. Now that SPAT is in a more complete form, this meeting is being held to seek further input from DFO Science through a more formalised process. Specifically, HMD would like to know whether SPAT has included all relevant data, and whether this data has been used appropriately to assess the likelihood of salmon presence.

Objectives

The objective of this meeting is to provide advice on the following questions:

1) Is the data used in SPAT to assess the likelihood of salmon presence appropriate within the context of SPAT?
2) Are there any missing data sources that should be included in SPAT?
3) Are the different types of data used weighted appropriately when used to establish the likelihood of salmon presence (i.e., should Live Gene Bank (LGB) activity be the primary indicator of salmon presence)?

Preparation

Newbould et al. 2006. (paper to be submitted by Habitat Management).

Outputs

Proceedings for documentation of discussion.

Participation

Participation will be by invitation and will include:

- DFO Science Branch
- DFO Oceans and Habitat Branch

The workshop would be chaired by Tana Worcester.

Appendix 2: Agenda

Workshop on the Inner Bay of Fundy (iBoF)
Salmon Presence Assessment Tool (SPAT)

June 26, 2006
Hayes Boardroom, B.I.O.
Dartmouth, N.S.

Chair: Tana Worcester

Agenda

10:00	Welcome and Introductions
10:05	Chair will review workshop remit and outline workshop purpose and process
10:15	Presentations of the Salmon Presence Assessment Tool – Andrew Newbold
10:45	Discussion
12:00	Lunch (hospitality not provided)
1:00-2:45	Discussion
2:45-3:00	Break (hospitality not provided)
3:00-4:00	Conclusions and Recommendations

Discussion Items

Line Gene Bank (LGB) Data:
- Has Line Gene Bank Data been used appropriately?
- Should LGB activity be used as the primary indicator of iBoF salmon presence?
- Should older LGB release sites be dealt with differently than recent sites?

Fish Passage Barrier Data:
- Are there other sources of information on barriers that should be included?
- Has information on barriers been used appropriately?
- How should partial barriers to fish passage be dealt with?
- Should age class specific barriers be considered?

Electrofishing Data:
- Is the use of electrofishing data appropriate for this purpose?
- Can iBoF salmon be effectively differentiated from non-iBoF salmon in the field?
- Should older electrofishing results be treated differently from recent results?

Parr Production Data:

- Is the use of parr production data appropriate for this purpose?
- Are there other sources of available information that could be used?
- Is the ranking system appropriate?

Historical Catch Data:

- Is this use of historical catch data appropriate for this purpose?

Outcomes:

- What other limitations of this tool should be taken into consideration?
- What are some other potential uses or benefits that might not have been considered?

Appendix 3: Participant List

Workshop on Inner Bay of Fundy (iBoF)
Salmon Presence Assessment Tool (SPAT)

June 26, 2006
Hayes Boardroom, B.I.O.
Dartmouth, N.S.

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